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tytuł pracy: ***„Biomarkery rozrostu tkanki tłuszczowej u otyłych, starzejących się zwierząt”***

SUMMARY

The major role of adipose tissue (AT) is to store energy. Chronic positive energy balance leads to adipose tissue expansion (ATE); however, expandability is a limited process. Although mechanisms controlling the development of differentiated AT have been well described, the regulation of ATE in the whole animal is less established. Genes controlling the size and enlargement of adipocytes in an environment of positive energy balance might be seen as a novel targets for prevention and/or treatment of problems arising from excess body fat and possibly its consequences on insulin resistance.

The purpose of this research project was to investigate mesoderm specific transcript (*Mest*) and secreted frizzled-related protein-5 (*Sfrp5*) as potential genes that may drive ATE during obesity. The obesity phenotype development was described with: a model for early onset of obesity presented by leptin-deficient mice (*ob/ob*); a model for late onset of obesity presented by C57BL/6J mice with an inherent risk of obesity (DIO) when fed a high-fat diet (HFD); and non-obese control mice. We have shown that the balance of factors that controls the increase in fat mass can be characterized in part by *Mest* and *Sfrp5* differential expression profiles with functions linked to fat deposition as long as there is an active accumulation of fat mass; that underpins that significant associations between gene expression regulation and obesity are lost when the adiposity phenotype has reach a steady-state. Our results on *Mest* and *Sfrp5* have drawn our attention to the age of animals and the presumptive differential regulation of the aging processes in the AT. Fat mass redistribution during aging occurs across species and may be associated with age-related diseases. Thus, the next step was to describe how aging is affected by the obesity state and to show similarities between those two conditions. Vast literature on obesity and aging leads to the conclusion that obesity development and body fat age-related changes could be key factors in a cycle that accelerates the aging process and the onset of age-related diseases. It is ambiguous how to define and/or measure tissue age; however, there is evidence suggesting that obesity escalates the biological age of particular tissues and

cell types. In further research we demonstrated that the expression of *Mest* and *Sfrp5* genes does not depend on age of the animal when subjected to HFD. Moreover, cold exposure experiments, suggested that temporal WAT browning and improvement in glucose metabolism together with AT remodelling may affect/impair the expression levels of ATE genes in the development of diet-induced obesity. No individual is living in constant obesogenic environment; additional studies are necessary to fully understand if proposed ATE markers expressions might be fully inhibited, and their inhibition can influence future fat mass accretion.